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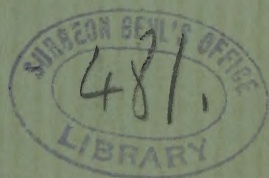
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AMŒBÆ IN AN ABSCESS OF THE JAW.

BY SIMON FLEXNER, M. D., *Associate in Pathology.*

[From the Pathological Laboratory of the Johns Hopkins University and Hospital.]



[From *The Johns Hopkins Hospital Bulletin*, No. 25, September, 1892.]

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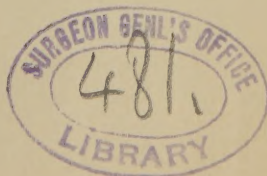
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That amœbæ may be associated with definite pathological lesions has been abundantly proven by the study of amœbic dysentery and its complications. The presence of living amœbæ in the intestinal lesions and in the stools, in the liver and lung abscesses complicating the disease, and in the sputa of the last class of cases, has been established, and an extensive study of several cases of this affection has recently appeared from this Laboratory and Hospital.¹ No room for doubt is left that the amœbæ bear a definite relation to the pathological process. This result has confirmed the belief entertained by many pathologists and bacteriologists, that other micro-organisms than bacteria would be found associated with disease-processes. We have just observed living amœbæ in a case of abscess of the jaw communicating with the oral cavity.

During the year a case was reported by Nasse² in which, following operation for amœbic abscess of the liver, gangrene developed in the track of the external wounds, and large bodies, differing from the cells of the tissue, and believed to be amœbæ, were found in large numbers in the tissues around the external incisions. The autopsy leaves no doubt of the character of the disease. The intestines showed the lesions of amœbic dysentery, and bodies resembling the amœba dysenteriae (Councilman and Lafleur) were found in the ulcers and in the pus from the liver. In none of the situations were the amœbæ found in an active condition, and this is accounted for by the delay, amounting to several hours after the death

¹ Councilman and Lafleur: *Amœbic Dysentery*. Johns Hopkins Hospital Reports, Vol. ii., 1891.

² Ueber einen Amöbenbefund bei Leberabscessen, Dysenterie und Nosocomialgangrän. *Archiv für klinische Chirurgie*, Band 43, 1892, p. 40.



of the patient, before the material was examined microscopically. The nature of the liver abscesses was not suspected during life. We give a part of the report of this case.

The patient was a man 60 years old, an American, on a short trip abroad. He had never suffered from dysentery. After his admission to the Hospital a diagnosis of abscess of the liver was made and two operations were performed. The first embraced an incision through the abdominal walls on the right side over the liver; the second consisted in the resection of a part of the ninth rib. Two abscesses were evacuated. About two weeks after the operation gangrene was noticed in the wounds. At first the patient's bowels were constipated; later an obstinate diarrhoea set in. Patient died from what was regarded as septicæmia.

On the right side, two fingers' breadth from the median line in the abdomen, was a wide, deep, purulent wound, beginning under the costal arch and reaching 8 cm. posteriorly. Around this the skin was gangrenous. On the margin of the gangrene the skin was swollen, discolored and beset with hemorrhages. The epidermis was lifted up and the cutis exposed. The cutis covering the gangrenous part was superficially dry, leather-like and mummified. Below, the gangrene reached to the fascia. The external wound communicated with a cavity in the right lobe of the liver. A similar condition existed above in the wound in the wall of thorax.

The microscopical examination of the gangrenous skin showed many amœbæ in the tissues. In the central part of the gangrene nothing was preserved. The peripheral portions showed in places a partial preservation of some tissue elements; a few loops of sweat glands and vessels could be seen. Leucocytes were also to be made out and they were followed into the living tissue of the cutis, subcutaneous connective tissue and in the adipose tissue along the connective tissue septa, and in the lymph spaces of these tissues. In the central gangrenous area many bacteria occurred; in the peripheral zone they were found only in the superficial layers along the hair follicles and gland-ducts. Where the gangrene goes over into the adipose and deeper layers of the subcutaneous tissue, the bacteria were very few and in scattered colonies or entirely absent.

Remarkably large cells were found in this situation. They were taken for amœbæ. In the older gangrenous area they

were not to be made out with certainty. At the margins of the gangrene they were present in small numbers and occurred singly and in small groups. Where bits of fairly-preserved tissue remained there amœbæ were found accumulated, and hence they were very numerous in the margins of the gangrene and in the adjoining living tissue. They could be distinguished by their size and peculiarity of staining. In the cutis where the epithelium begins again, in the lymph-spaces deeper down, and in the connective tissue processes separating fat bundles, they were most numerous. Indeed, they seemed to force themselves a considerable distance into the living tissue, and this latter does not in all cases show any corresponding change. Again, in similar places a rich cellular infiltration had taken place, and softening was beginning. The amœbæ were found in the cutis in lymph spaces and in wider lymphatic vessels.

The case we wish to report occurred in the Johns Hopkins Hospital, in the service of Dr. Halsted (Dr. Finney acting). J. G., white, 62 years old, was admitted on September 5th, 1892. He complained of painful swelling in the front of the neck below the jaw.

The patient is a Virginian, and has not had in recent years any severe illness. He suffered in his childhood from the troubles common to that period of life, and later, when grown, he was ill for ten days from a fever, the nature of which he does not know. Last September (just one year ago) he had an attack of obstinate constipation accompanied with pain, which was relieved by appropriate treatment. He has never suffered from any diarrhoeic disease whatever.

In November, 1890, he first noticed a small hard lump within the mouth, under the gum over the front part of the lower jaw, just to the right of the median line. In January, 1891, this was removed by an operation. No further trouble was experienced until June of last year (1891), when an ulcer occurred at the site of the operation, exposing the bone beneath. A slight discharge into the mouth from this source has continued ever since. In August a hard swelling appeared in the floor of the mouth. This gradually enlarged and extended beneath the chin to the front of the neck and beneath the jaw, making a large and prominent swelling which occupied the entire space included within the arch of the inferior maxillary bone. The width of the mass corresponded with the lower jaw,

and it extended backward to the angle of the jaw and downward to the cricoid cartilage. The mass was firm, indurated and immovably fixed, and felt like a solid growth. There was, however, one point where fluctuation was apparent and tenderness present. This corresponded to the most prominent part of the tumor in front.

The lower set of teeth is deficient, and on the upper aspect of the transverse portion of the lower jaw was an area of denuded bone occupying the place of the two incisors and the canine of the right side. The exposed bone was spongy in appearance and evidently necrotic. It was in part covered with a dirty grayish purulent material and shreds of greenish sloughy tissue. The whole of the floor of the mouth was filled by a hard, resisting mass. On making firm pressure over the tender and fluctuating area on the front aspect of the tumor, a small amount of dirty purulent material was observed to ooze from an opening in the mouth over the necrotic bone. The breath had a very offensive odor. No lymphatic enlargement in the neck.

On September 6th, under ether narcosis, an incision 0.6 cm. in length was made in the median line of neck under the chin at the point of fluctuation. The opening led into a large abscess cavity, the walls of which were very thick, and about 80 cc. of pus were evacuated. The finger introduced into the cavity and moved about entered several pockets. The dead bone was thoroughly scraped away and the abscess cavity stuffed with iodoformized gauze. At the present writing (Sept. 25th) the patient is still in the Hospital and improving rapidly.

The microscopic examination of the pus evacuated from the abscess cavity was not made for several hours after its removal. Macroscopically it was not very thick, was mixed with a small quantity of blood, and contained a number of small flakes and granules whiter and more opaque than the other constituents. It was grayish-yellow in color, and the odor which it emitted was particularly offensive, suggesting faecal matter.

Microscopical examination showed at once a large number and variety of bacteria, and in a fresh and untreated specimen of the pus many actively motile bacteria were observed. In such a fresh specimen we were surprised to find, mixed with the pus cells, detritus and red blood corpuscles, larger cells possessing the power of altering their forms. Closer

observation soon led to the conclusion that these bodies were not tissue elements, and they were recognized as amœbæ.

In the fluid portion of the pus these amœbæ were fewer in number than in the opaque flakes mentioned above, and while some fields of the microscope (Leitz, No. 7 objective and No. 3 eyepiece) did not contain any, others showed several in each field. In striking contrast to this picture was that furnished by the examination of the flakes. By gently teasing these out in normal salt solution, a surprisingly large number of amœbæ were found. Every field showed one, and most fields several. After having once been seen they could easily be recognized among the other cells, even after they became round and ceased to exhibit motility. They were much larger and possessed a different refraction than the pus cells. Their contents, too, were totally different from the granular and fatty material enclosed by the leucocytes, and they much exceeded the latter in size. These flakes of white tissue evidently consist of necrotic and detached pieces derived from the walls of the abscess, and it would appear as if they were permeated by leucocytes and amœbæ.

Such fresh preparations as just described exhibited without further treatment moving amœbæ. However, after a time, varying in different specimens but not exceeding in the longest ten or fifteen minutes, the amœbæ would either cease altogether to move and assume a round form, or they would move so sluggishly that long watching was required to make out the fact that a change in form had taken place. If, now, the slide were carefully heated over a Bunsen flame and tested every few seconds by bringing it in contact with the palm of the hand so as to avoid overheating, and examined at once, the movement was seen to have recommenced, and, indeed, to have become more active than before. This could be repeated a number of times with the same slide if evaporation was prevented.

In unheated specimens the movements are not so rapid but that the changes can readily be followed and drawings obtained, and towards the close of their activity, when the movements are very slow and slight, drawings were necessary in order to be convinced that a change of form had taken place. It was also observed that in the latter series of movements the longest time was expended by the amœba in putting out a part of itself; the retraction was much more rapidly

performed. On the other hand, in the heated specimen the alteration in form was often so rapid that in endeavoring to follow and make drawings of all the changes through which a particular amoeba passed in a given time some were necessarily lost.

In the resting state they were either round or oval and more highly refractive than the leucocytes. In this condition no separation into ectosarc and endosarc was distinguished, and, indeed, we were not able completely to convince ourselves of this division, even in the moving amoebæ. The round and resting bodies as well as those exhibiting motility contained, as a rule, vacuoles which varied in size and number in different specimens.

The motility was of two kinds and corresponded with the description given by Councilman and Lafleur. They consisted of a progressive movement and the putting forth and retraction of pseudopodia. The movement of progression was only exceptionally observed and never amounted to considerable excursions of the amoebæ. The whole of the amoebæ seemed to participate in the protrusion of pseudopodia with the exception of those rare instances in which the vacuoles remained stationary and did not form a part of the protruded mass. The pseudopodia were usually blunt. They were extruded in different degrees, sometimes a mere bulging was all the evidence indicating such a change, while at other times the greater part of the amoeba was protruded. There was much difference in respect to the rapidity of these movements in accordance with what has already been stated. Moreover, we observed, especially in some of the heated specimens, a fact pointed out by Councilman and Lafleur, that after a period of quiescence there would suddenly arise a quick succession of movements, to be succeeded again by a state of rest.

The peripheral zone of protoplasm was homogeneous and less refractive than the central part. The contents of the amoeba consisted of granular material,¹ vacuoles and red blood corpuscles. Leucocytes as such were not distinguished in these contents. We thought that a nucleus could occasionally be seen, but we were unable to convince ourselves of this.

The iodoformized gauze packing was removed the day

¹This appearance may be due, as explained by Councilman and Lafleur, to the presence of a large number of minute vacuoles.

after the operation, and the secretion contained on it examined. Large bodies, circular in form and similar to the quiet amœbæ, were detected. Careful heating as before mentioned of a suspension in salt solution failed to elicit motility in these bodies. They evidently were dead.

In view of the fact that the characters of the amœbæ present in the pus of this abscess and in larger numbers in the necrotic material found in the pus, resemble in so many respects those of the amœba dysenteriae first described by Lösch and since by many others, we are led, in the absence of definite means of distinguishing forms which may have much in common but yet be totally unlike, to regard these as allied species if not identical. We have on several occasions had the opportunity of observing and studying amœbæ occurring in the stools in amœbic dysentery, and from liver and lung abscesses complicating this disease, and we do not think that by means of such criteria as we now possess it would be possible to distinguish between the latter and those found in the abscess just described.

It is to be regretted that no opportunity was afforded for the study of the relation of the amœbæ to the tissues. The favorable progress of the case entirely precluded this being done. In the absence of that important criterion, the relation between the amœbæ and the pathological process, only their presence can be positively asserted; but we would draw attention to the fact brought out by Nasse's case, namely, that amœbæ can enter the subcutaneous tissue and be associated with at least suppurative changes. As to the probability of the gangrene being likewise the result of the presence of the amœbæ, the author does not commit himself. In none of the four operated cases reported by Councilman and Lafleur was there such a complication, and Kartulis¹ has never, in a very large number of cases which he observed, seen gangrene follow operation. In one case which he cites the abscess opened spontaneously through the abdominal walls, and at the autopsy numerous fistulæ were found in the muscles leading to the skin. Amœbæ were present, but no necrosis of skin.

The character of the pus in amœbic abscess of the liver is so different from that obtained from the abscess in the jaw that the stinking quality of the latter must be considered to

¹ Centralblatt für Bakteriologie, Band 12, p. 473, 1892.

have been due to bacteria. Concerning the probable source of infection with the amœbæ, no suggestion can be offered.

Note.—On September 26th a piece of rubber tissue containing a small quantity of pus was removed from the rapidly cicatrizing cavity of the abscess, and with little delay examined. The pus was creamy in appearance and devoid of offensive odor. There were observed mixed with the pus cells a few larger cells, resembling in all respects the dead amœbæ. These contained refractive granules, but few large vacuoles. Stained preparations of this pus showed streptococci as the only kind of bacteria present. They formed short chains and diplococci, and were contained oftener than not within pus cells. The large cells, taken to be dead amœbæ, had a totally different appearance from the leucocytes. In staining the pus two methods were employed: 1st, simply spreading, drying, and staining, as commonly done for bacteria; 2d, the pus was spread on a cover-slip, permitted to become air-dry, and then hardened in alcohol. The cover-slip was then stained in safranin, bleached in alcohol, cleared in oil of cloves, and mounted in balsam. Prepared in the latter way the large cells were without distinct nuclei, but the whole of the protoplasm took the stain. The protoplasm was finely or coarsely granular, and in one or two instances had contracted away from one side of the limiting membrane, suggesting a separation into ectosarc and endosarc.

